Claims 1 to 17 remain in this application as amended.

The rejection of Claims 1 to 17 under 35 U.S.C. 103 as unpatentable over WO 94/20593 or WO 96/23855 or Hart et al. (US Patent No. 5,833,721) is respectfully requested.

It is respectfully submitted that when the nature of Applicants' claimed invention is fully understood and appreciated, and the data presented in Applicants' examples is fully comprehended, it is abundantly clear that the cited documents do not disclose, teach, suggest or in any way render obvious under 35 U.S.C. 103 Applicants' claimed invention.

Applicants' invention relates to enhancing engine and injector cleanliness by the use of a certain specific dispersant additive in low sulfur content fuel oil compositions. Many additives for enhancing engine cleanliness have been suggested over the years. Among the many such additives have been

(1) a polybutenyl bis(succinimide) produced from a polybutenyl succinic anhydride and tetraethylene pentamine (2:1 ratio, pb mol wt about 1200) such as disclosed in cited WO 94/20593 -- see page 6, lines 10 to 14; and

(2) a succinimide ashless dispersant being the reaction product of 1.5 equivalents of polyisobutyl succinic anhydride of molecular weight 950 with one equivalent of polyethylene polyamine mixture of average composition approximating to pentaethylene hexamine such as disclosed in cited WO 96/23855 and US Patent No. 5,833,721 -- see page 5, line 17 to page 6, line 9 of WO 96/23855 and column 20, lines 6 to 14 of US Patent No. 5,833,721.

However, these succinimide ashless dispersants are not the dispersant additives of the present invention and Claims 1 to 17. The dispersant additives of the present invention and claims differ from the succinimide ashless dispersants in the cited documents. The dispersant additive of the invention and claims is the reaction product of **4:3 to 1:10 molar**

ratio (i.e., a ratio of 1.3 to 0.1) of (A) a polyalkenyl derivative of monoethylenically unsaturated C_4-C_{10} dicarboxylic acid material **in which the number average molecular weight of the polyalkenyl chain is in the range of 850 to 1150** with (B) a polyamine of the formula $H_2N(CH_2)_m$-$[NH(CH_2)_m]_n$-NH_2, where m is 2 to 4 and n is 1 to 6.

In contrast, the succinimide dispersant additives of the cited documents are the reaction products of either a 1.5:1 or a 2.0:1 ratio of reactants, and in the case of WO 94/20593, the molecular weight of the polybutenyl chain is 1200.

Applicants' specification and the Examples therein demonstrate that these distinctions over the prior art disclosures are critical and unobvious and produce dramatically more effective and unobviously enhanced injector cleanliness in low sulfur fuel oil compositions. Moreover, Applicants' specification and the Examples therein further demonstrate that such unobviously enhanced cleanliness results **are not obtained**:

(1) in high sulfur content fuel oils;

(2) with similar dispersant additives that differ only in the ratio of reactants, i.e., are at a ratio in excess of 4:3, namely at 1.5:1 or 2:1;

(3) with similar dispersant additives that are within the 4:3 to 1:10 ratio but where the molecular weight of the polybutenyl chain is outside the claimed 850 to 1150 range, i.e., with a molecular weight of the polybutenyl chain of 350, 570, 780 or 1300; and

(4) with similar dispersant additives where the polybutenyl chain is within the claimed 850 to 1150 range and the ratio of reactants is within the 4:3 to 1:10 range but the polyamine reactant has a structure outside the claimed structure of Applicants' polyamine reactant (B), namely where the polyamine is 3-dimethylamino-propylamine.

The data supporting the aforesaid, unexpectedly superior cleanliness properties (fouling index (FI) as discussed on page 20, lines 14 to 20) is set forth in the data in Tables 3, 4 and 5.

For example, in Table 3 on page 21, Examples 1 and 2 (employing dispersant additive 1 of the present invention at treat levels of 250 and 200 ppmw, respectively) produce FI's of 12 and 15 in the low sulfur fuel. In contrast, Comparative Examples III and IV with the same dispersant of the invention, but in high sulfur fuel oil, produces FI's of 19 and 22. Additionally, the FI's values of 12 and 15 for Examples 1 and 2 in low sulfur fuels are significantly better than the FI results (24 and 31) for comparative dispersant A (Examples Comp I and Comp II) in the low sulfur fuel oil.

Similarly, in Table 4 on page 23, Examples 3 and 4 with dispersant additives 1 and 2 of this invention produce FI's of 12 and 12, respectively, whereas Examples Comp. XI, XII and XIII, which differ only in the molecular weight of the polybutenyl chain being outside the claimed 850 to 1150 range (i.e., at 780, 750 and 1300, respectively), produce FI's of 22, 19 and 26. Additionally, while Examples 3 and 4 both produce FI's of 12, similar dispersants in Comp. I and IX, but produced with coupling ratios of 1.5:1 and 2:1 (outside the claimed range), produce FI's of 24 and 28. Also, while Examples 3 and 4 of the invention produce FI's of 12, a similar dispersant but of a polyamine outside the claims (namely, DAP - i.e., 3-dimethyl-aminopropylamine) produces a FI of 25.

Further, in Table 5 on page 26, it will be seen that Examples 5 and 6 with dispersant additives of the invention produce FI's of 24 and 0.6, respectively, whereas Example Comp. XIV with an additive similar to the Example 5 additive but produced with a coupling ratio of 1.5:1 (outside the claim), gave a FI of 28, and Example Comp. XV with an additive similar to the Example 6 additive, but produced with a polybutenyl chain of molecular weight of only 350, resulted in such severe fouling that the injector needles stuck in the nozzles.

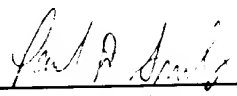
Nothing in the cited references would suggest their modification to employ in combination, the bonding ratio of 4:3 to 1:10, a polyalkenyl chain of molecular weight of from 850 to 1150 and the specified polyamines in order to produce a detergent additive that exhibits significantly improved antifouling properties in low sulfur content fuel oils. The prior art disclosure must teach the invention or motivate one skilled in the art to make the required

modifications to arrive at the claimed invention. In re Carroll, 601 F.2d 1184, 1186, 202 USPQ 571, 572 (CCPA 1979); In re Clinton, 527 F.2d 1226, 1228, 188 USPQ 365, 367 (CCPA 1976). The prior art disclosure must be such that one of ordinary skill in the art would reasonably expect the method of the reference disclosure to be successful in producing the desired result. In re O'Farrell, 853 F.2d 894, 904, 7 USPQ 2d 1673, 1681 (Fed. Cir. 1988). "Both the suggestion and expectation of success must be founded in the prior art, not in Applicant's disclosure." In re Dow Chemical Co., 837 F.2d 469, 473, 5 USPQ 2d 1529, 1531 (Fed. Cir. 1988). Nothing in the cited prior art disclosures would suggest or teach one skilled in the art to expect Applicants' claimed additives to possess the unexpectedly superior cleanliness (antifouling) properties in low sulfur content fuel oil compared to the cleanliness (antifouling) properties of closely related but different dispersant additives as demonstrated in the afore-discussed comparative examples.

Therefore, it is respectfully submitted that the rejection of Claims 1 to 17 over WO 94/20593 or WO 96/23855 or US Patent No. 5,833,721 is erroneous, and its withdrawal is respectfully requested.

It is respectfully submitted that the foregoing is a full and complete response to the Office Action and that all the claims are allowable for at least the reasons indicated. An early indication of their allowability by issuance of a Notice of Allowance is earnestly solicited.

Respectfully submitted,

By: 

Paul D. Greeley
Reg. No. 31,019
Attorney for Applicant

Ohlandt, Greeley, Ruggiero & Perle, L.L.P.
One Landmark Square, Ninth Floor
Stamford, CT 06901-2682
Tel: (203) 327-4500
Fax: (203) 327-6401
Date: March [illegible], 1999